ProbeTip

Torque Measurement

A rotating machine does not turn at a constant angular velocity even under a steady state condition. Slight variations in the speed of the shaft are called angular vibrations, while variations in the twist of the shaft are called torsional vibrations. These vibrations are caused by varying loads, varying driving forces or oscillations within the shaft itself.

High levels of angular or torsional vibration can seriously shorten the life of a machine. Shaft stresses and potential cyclic stresses in the gear teeth must be properly documented to provide direct insight into the life expectancy of the rotating systems, based on the number of starts and stops of the motor.

Torsional or angular vibration can be measured in several ways. For example, two proximity or optical transducers can observe a reference mounted on the shaft. The reference is usually a precision manufactured gear or reflective tape with evenly spaced marks on it. The transducers are mounted 180° apart in-line with the reference gear and observe the time interval from one tooth to the next. If the shaft is moving at a constant velocity, there is no variation in the tooth-to-tooth timing and no angular vibration. If there is angular vibration, the tooth-to-tooth timing will change. The transducers will detect these changes and send the signal to a monitoring instrument.

Another alternative involves the permanent installation of Bently Nevada's new torque transducer (TorXimitor®) which requires no mechanical modifications to the coupling. The patented noncontacting technique for transferring torque from the rotating shaft provides a reliable signal under actual machine operating conditions. This innovative transducer provides reliable measurements of transferred energy from various types of machinery including prime movers, such as a motor or turbine or a process load such as a compressor or pump.

Torque measurements can lead to fewer machinery failures and lower energy costs. They are particularly applicable for:

- Test stand/shop testing
- On-site commissioning
- On-line condition monitoring
- Performance optimization
- Research and development testing